Munich Cancer Registry

- Survival
- Selection Matrix
- Homepage

Munich Cancer Registry at Munich Cancer Center
Marchioninistr. 15
Munich, 81377
Germany

http://www.tumorregister-muenchen.de/en

Cancer statistics: Baseline statistics

C32, C10.1: Larynx cancer

Year of diagnosis	1998-2011
Patients	1886
Diseases	1889
Creation date	04/02/2013
Export date	01/03/2013
Population	4.5 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C32__E.pdf

Global Statements about the statistics on the Internet − Baseline Statistics (grey button), Survival (red button)

In these analyses, the clinics and physicians of Upper Bavaria and the city and county of Landshut[#], with a total of 4.5 million inhabitants, account for the frequency of cancer diseases[##] and the achieved long term results. Additionally, the long term survival evaluated by the Munich Cancer Registry (MCR) is compared with the results of the population-based registry in the USA (SEER), which is useful for checking the consistency of the data on an international level.

In comparing several tables, inconsistent figures may be detected. This is based on the fact that different patient cohorts are included in the base calculation, for example when proportions of multiple tumors or DCO-cases[###] are concerned. In other cases the individual tumor diagnosis is the basis for calculation, for example with incidence.

The foot notes describe the currentness of the data. The baseline statistics and survival data are updated annually. This yearly analysis comprises the Annual Report of the MCR. The time-delayed acquisition of data and the occasionally high DCO-rates indicate optimizing reserves, among others, because of current financial and legal conditions that hinder the analyses.

Clinics and physicians have access to essentially more detailed data, with which they can check, compare and in the best case optimize their own data and results.

We would be pleased to receive corrections, critique and useful suggestions. Just send an e-mail to tumor@ibe.med.uni-muenchen.de.

Munich Cancer Registry, April 2013

[#] Base data has been collected since 1998. An increase in new diseases is apparent, which is an effect of two extensions in the MCR catchment area (from a base population of 2.51 million to 3.96 in 2002, and to 4.52 million in 2007). Death certificates from 2011 are incorporated into these analyses.

[##] Due to the high frequency and good prognosis of non-malignant skin cancer (C44), no systematic ascertainment is performed for this diagnosis. C44 is not designated as a primary, but rather as a secondary tumor.

[###] DCO (death certificate only) identifies a cancer case that first becomes available to the MCR through the death certificate. A high proportion of DCO cases (≥5%) in particular cancer types indicate insufficient participation of specific cancer specializations.

Some remarks regarding this cancer type

As a general rule, these few results from the TRM form the basis of sophisticated analyses. For head and neck tumors this is not the case. Therefore the results for head and neck tumors should be interpreted with caution. In part this is due to problems of classification because of limited specific details of locality. Additionally, with advanced tumors in a close topographic location it is often not possible to determine the exact ICD localization of a tumor.

ICD-10 codes used for specifying cancer site

ICD-10	Description
C32.-	Malignant neoplasm of larynx
C32.0	Glottis
C32.1	Supraglottis
C32.2	Subglottis
C32.3	Laryngeal cartilage
C32.8	Overlapping lesion of larynx
C32.9	Larynx, unspecified

INCIDENCE

Table 1

Patient cohorts by year of diagnosis including DCO cases and multiple primaries, and with proportion of deaths and active follow-up

Year of diagnosis	Cases # n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %
1998	105	4	3.8	28.6	64.8	92.4
1999	100	7	7.0	35.0	61.0	96.0
2000	94	5	5.3	34.0	66.0	96.8
2001	87	2	2.3	35.6	62.1	98.9
2002	178	14	7.9	34.3	64.0	97.8
2003	150	11	7.3	34.0	62.0	98.0
2004	143	14	9.8	34.3	62.2	97.2
2005	150	5	3.3	34.0	50.7	94.0
2006	133	7	5.3	31.6	49.6	96.2
2007	152	10	6.6	31.6	48.7	80.9 ##
2008	173	12	6.9	35.3	43.9	73.4
2009	169	12	7.1	28.4	38.5	72.2
2010	135	7	5.2	30.4	36.3	85.2
2011	120	10	8.3	23.3	25.0	66.7 ###
1998-2011	1889	120	6.4	32.2	51.7	88.2

The increases of incident cases in 2002 and 2007 reflect the expansion to additional registry areas.

Since 2007 the percentage of actively followed patients sharply declined compared to the previous years. This is a consequence of ambiguous data protection rules that currently forbid cancer registries in Bavaria to obtain the essential life status informations from competent registration offices.

Please be aware that data of recent annual patient cohorts may not yet be fully processed. Therefore, the presented figures and tables are potentially related to different time periods as pointed out in the respective headlines or legends.

Table 1a

Patient cohorts by year of diagnosis and gender
including DCO cases

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	105	93	12	88.6
1999	100	85	15	85.0
2000	94	77	17	81.9
2001	87	77	10	88.5
2002	178	153	25	86.0
2003	150	129	21	86.0
2004	143	127	16	88.8
2005	150	136	14	90.7
2006	133	111	22	83.5
2007	152	130	22	85.5
2008	173	151	22	87.3
2009	169	148	21	87.6
2010	135	118	17	87.4
2011	120	94	26	78.3
1998-2011	1889	1629	260	86.2

Table 2

Incidence measures by year of diagnosis and gender including DCO cases
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.52 m as of 2007, respectively)

Year of diagnosis	Males n	Females n	Males Inc. raw	Fem. Inc. raw	Males Inc. WS	Fem. Inc. WS	Males Inc. ES	Fem. Inc. ES	Males Inc. BRD-S	Fem. Inc. BRD-S
1998	93	12	8.4	1.0	5.3	0.5	7.5	0.8	8.7	0.9
1999	85	15	7.6	1.3	4.7	0.7	6.7	1.0	7.7	1.2
2000	77	17	6.8	1.4	4.3	1.0	6.1	1.2	7.2	1.4
2001	77	10	6.6	0.8	4.1	0.4	5.8	0.6	6.7	0.7
2002	153	25	8.2	1.3	5.2	0.6	7.2	0.9	8.0	1.1
2003	129	21	6.9	1.1	4.2	0.5	5.8	0.8	6.8	0.9
2004	127	16	6.8	0.8	4.0	0.5	5.6	0.7	6.6	0.7
2005	136	14	7.2	0.7	4.2	0.4	6.0	0.6	6.9	0.6
2006	111	22	5.8	1.1	3.6	0.6	4.9	0.9	5.5	1.0
2007	130	22	5.9	1.0	3.4	0.6	4.9	0.8	5.6	0.9
2008	151	22	6.8	0.9	3.7	0.6	5.5	0.8	6.6	0.9
2009	148	21	6.6	0.9	3.7	0.4	5.2	0.6	6.3	0.7
2010	118	17	5.2	0.7	2.9	0.3	4.1	0.5	4.9	0.6
2011	94	26	4.2	1.1	2.2	0.6	3.2	0.8	3.9	0.9
1998-2011	1629	260	6.5	1.0	3.8	0.5	5.4	0.7	6.3	0.9

The computation of the incidence measures includes all primaries, irrespective of first or subsequent malignancy.

Table 3

Age distribution parameters by year of diagnosis (All)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	105	61.9	10.7	32.9	85.8	48.5	54.9	59.4	70.1	76.1
1999	100	64.0	11.2	26.1	87.7	50.9	56.8	64.5	71.2	76.9
2000	94	61.6	13.4	19.7	90.8	46.0	53.3	61.1	69.7	80.0
2001	87	63.7	10.5	42.5	93.7	49.4	57.7	62.3	69.6	77.6
2002	178	63.1	10.0	37.0	91.2	50.4	56.5	62.2	68.8	76.3
2003	150	64.0	10.5	39.8	94.4	51.3	56.5	63.8	70.5	78.5
2004	143	63.8	10.8	33.8	90.9	48.6	57.6	64.2	71.0	78.4
2005	150	63.8	10.3	32.6	89.6	51.0	56.8	64.2	70.0	77.1
2006	133	63.7	10.0	35.4	90.0	51.6	58.0	63.0	69.7	76.3
2007	152	64.1	10.3	39.2	87.5	50.1	56.6	64.2	70.7	78.6
2008	173	66.4	10.5	39.4	97.5	52.9	58.5	66.7	72.3	79.5
2009	169	66.3	11.4	30.0	94.8	52.3	58.7	66.7	74.1	80.4
2010	135	66.5	9.8	42.5	89.5	52.5	58.8	66.8	73.4	78.6
2011	120	67.1	10.4	33.3	90.2	54.1	59.3	68.4	73.6	81.0
1998-2011	1889	64.4	10.7	19.7	97.5	50.7	57.1	64.3	71.4	78.6

Table 3a

Age distribution parameters by year of diagnosis (MALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	93	61.7	10.6	32.9	85.8	48.5	54.9	60.1	69.6	75.3
1999	85	64.1	10.3	38.4	87.7	51.3	57.2	64.5	71.0	76.6
2000	77	62.1	11.9	38.3	89.6	49.0	53.7	60.6	68.3	80.0
2001	77	63.3	9.8	42.6	93.7	51.7	57.8	61.9	68.9	75.4
2002	153	62.1	9.6	37.0	89.6	49.5	56.1	61.7	68.0	74.6
2003	129	63.4	10.0	39.8	88.4	51.0	56.9	63.5	69.5	76.1
2004	127	64.1	10.5	40.8	90.9	48.6	57.9	64.2	71.0	78.6
2005	136	64.2	10.0	39.7	89.6	51.4	57.0	64.3	70.5	77.4
2006	111	63.3	10.1	35.4	90.0	51.5	57.5	62.8	69.7	74.0
2007	130	64.6	9.9	42.3	87.5	51.3	57.0	64.5	71.0	78.6
2008	151	67.1	10.3	45.0	97.5	53.7	59.7	66.9	74.1	79.5
2009	148	65.8	10.4	34.6	88.2	52.3	58.2	66.6	73.7	79.1
2010	118	65.9	9.7	42.5	89.5	52.0	58.6	66.7	72.4	78.4
2011	94	67.5	10.0	45.8	86.5	55.0	59.9	68.4	74.8	81.1
1998-2011	1629	64.4	10.3	32.9	97.5	51.3	57.2	64.3	71.1	78.2

Table 3b

Age distribution parameters by year of diagnosis (FEMALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	12	63.3	11.5	47.2	84.5	52.0	56.0	58.0	71.9	78.6
1999	15	63.6	15.7	26.1	84.4	49.4	52.1	68.9	75.6	79.8
2000	17	59.2	19.0	19.7	90.8	29.9	46.0	66.7	70.1	84.2
2001	10	66.8	15.4	42.5	92.0	43.7	56.2	68.7	77.0	86.6
2002	25	68.8	10.8	48.3	91.2	54.3	61.1	67.7	76.3	81.2
2003	21	67.7	12.7	48.8	94.4	52.7	56.5	64.9	77.3	82.8
2004	16	61.4	13.0	33.8	84.6	41.2	54.1	62.2	70.8	78.0
2005	14	59.6	11.8	32.6	79.0	45.3	55.4	62.4	66.5	68.5
2006	22	65.2	9.5	49.1	83.7	54.6	58.4	63.3	69.9	82.2
2007	22	60.9	12.4	39.2	87.0	48.9	49.9	60.5	67.3	80.3
2008	22	61.2	11.1	39.4	84.9	50.8	53.9	60.1	70.0	72.1
2009	21	69.1	16.6	30.0	94.8	54.1	62.0	68.0	80.1	89.4
2010	17	70.4	10.4	47.2	86.1	56.4	63.5	71.8	77.4	84.6
2011	26	65.5	11.9	33.3	90.2	50.5	58.2	68.4	72.5	76.4
1998-2011	260	64.7	13.2	19.7	94.8	49.0	56.0	64.5	73.4	82.1

Table 4

Age distribution by 5-year age group and gender for period 1998-2011 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
15-19	1	0.1	0.1			0.0	1	0.4	0.4
20-24	0	0.0	0.1			0.0			0.4
25-29	3	0.2	0.2			0.0	3	1.2	1.5
30-34	5	0.3	0.5	2	0.1	0.1	3	1.2	2.7
35-39	13	0.7	1.2	10	0.6	0.7	3	1.2	3.8
40-44	38	2.0	3.2	33	2.0	2.8	5	1.9	5.8
45-49	106	5.6	8.8	90	5.5	8.3	16	6.2	11.9
50-54	185	9.8	18.6	162	9.9	18.2	23	8.8	20.8
55-59	296	15.7	34.3	257	15.8	34.0	39	15.0	35.8
60-64	351	18.6	52.8	308	18.9	52.9	43	16.5	52.3
65-69	326	17.3	70.1	296	18.2	71.1	30	11.5	63.8
70-74	261	13.8	83.9	225	13.8	84.9	36	13.8	77.7
75-79	164	8.7	92.6	140	8.6	93.5	24	9.2	86.9
80-84	85	4.5	97.1	63	3.9	97.4	22	8.5	95.4
85+	55	2.9	100.0	43	2.6	100.0	12	4.6	100.0
All ages	1889	100.0		1629	100.0		260	100.0	

Included in the statistics are 39.6% multiple primaries in males and 38.5% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2011

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=93 %	Females DCO rate n=27 %	Males Prop.all cancers n=132509 %	Females Prop.all cancers n=129521 %
0- 4			0.0	0.0				
5- 9			0.0	0.0				
10-14			0.0	0.0				
15-19		1	0.0	0.1				0.4
20-24			0.0	0.0				
25-29		3	0.0	0.2				0.3
30-34	2	3	0.1	0.2			0.2	0.2
35-39	10	3	0.5	0.1	10.0		0.5	0.1
40-44	33	5	1.5	0.2		20.0	1.2	0.1
45-49	90	16	4.6	0.8	6.7	6.3	2.0	0.2
50-54	161	23	9.6	1.3	1.9	4.3	2.2	0.2
55-59	257	39	16.5	2.4	4.3		2.1	0.3
60-64	308	43	20.2	2.7	3.6	2.3	1.6	0.3
65-69	296	30	21.7	2.0	5.7	3.3	1.3	0.2
70-74	225	36	21.8	2.9	5.8	13.9	1.0	0.2
75-79	140	24	20.7	2.4	7.1	12.5	0.8	0.2
80-84	63	22	15.5	2.8	12.7	36.4	0.6	0.2
85+	43	12	15.5	1.6	30.2	50.0	0.5	0.1
All ages	1628	260			5.7	10.4	1.2	0.2
Incidence								
Raw			6.5	1.0				
WS			3.8	0.5				
ES			5.4	0.7				
BRD-S			6.3	0.9				

The age-specific incidence characterizes the disease risk in a particular age group. The age distribution depends on the patient population frequency in each age group and reflects the tangible clinical picture of everyday patients care (see following chart).

Table 6a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2011
MALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06 Oral cavity	16	0.7	22.0	12.6	35.8	#	31.6	12.5
C09-C10 Oropharynx	21	0.9	22.3	13.8	34.1	#	41.4	14.3
C12-C13 Hypopharynx	11	0.5	20.9	10.4	37.3	#	21.6	
C15 Oesophagus	17	1.4	12.3	7.2	19.7	#	32.3	11.8
C16 Stomach	7	3.0	2.3	0.9	4.8		8.2	
C17 Small intestine	2	0.3	5.8	0.7	21.1		3.4	
C18 Colon	19	7.2	2.7	1.6	4.1	#	24.5	
C19-C20 Rectum	10	4.4	2.3	1.1	4.2	#	11.7	20.0
C22 Liver	14	2.0	6.9	3.8	11.6	#	24.7	7.1
C23-C24 Bile	3	0.7	4.4	0.9	12.8		4.8	33.3
C25 Pancreas	8	2.5	3.2	1.4	6.3	#	11.3	25.0
C30-C31 Sinuses	4	0.1	32.7	8.9	83.8	#	8.0	
C32 Larynx	2	0.9	2.3	0.3	8.3		2.3	
C33-C34 Lung	71	9.0	7.9	6.2	9.9	#	128.1	11.3
C43 Malign. melanoma	3	2.9	1.0	0.2	3.1		0.3	
C61 Prostate	20	21.9	0.9	0.6	1.4		-3.9	
C64 Kidney	8	2.7	3.0	1.3	5.9	#	11.0	12.5
C67 Bladder	4	3.0	1.3	0.4	3.5		2.1	
C73 Thyroid	2	0.5	3.7	0.4	13.3		3.0	
C76-C79 CUP	5	1.2	4.1	1.3	9.5	#	7.8	
C82-C85 NHL	5	2.8	1.8	0.6	4.2		4.5	
Other primaries	5	1.9	2.6	0.8	6.0		6.3	
Not observed	0	4.1	0.0	0.0	0.9	#	-8.5	
All mult. primaries	257	74.7	3.4	3.0	3.9	#	376.6	8.6

Patients	1225
Mean age at second malignancy (years)	66.5
Person-years	4840
Mean observation time (years)	4.0
Median observation time (years)	2.9

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category "Other primaries".

Table 6b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2011
FEMALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06 Oral cavity	3	0.0	64.1	13.2	187.2	#	39.5	
C09-C10 Oropharynx	4	0.0	110.7	30.1	283.3	#	53.0	
C15 Oesophagus	2	0.0	48.3	5.8	174.4	#	26.2	
C18 Colon	2	0.7	2.8	0.3	10.2		17.3	
C33-C34 Lung	10	0.5	18.8	9.0	34.5	#	126.7	
C50 Breast	5	2.4	2.1	0.7	4.9		34.9	
C76-C79 CUP	3	0.1	25.5	5.3	74.7	#	38.6	
Other primaries	6	1.5	4.1	1.5	8.9	#	60.6	16.7
Not observed	0	2.1	0.0	0.0	1.7		-28.7	
All mult. primaries	35	7.5	4.7	3.3	6.5	#	368.0	2.9

Patients	196
Mean age at second malignancy (years)	68.0
Person-years	747
Mean observation time (years)	3.8
Median observation time (years)	3.1

The occurrence of second malignancy is statistically significant.

Observed second malignancy with count 1 are pooled in category "Other primaries".

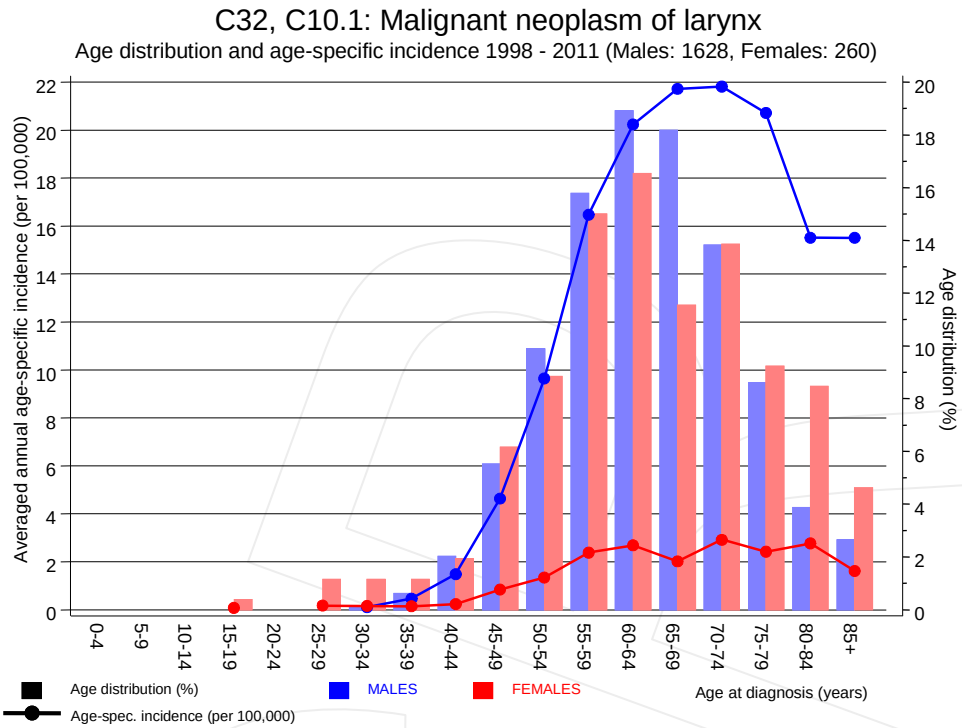


Figure 7. Age distribution and age-specific incidence

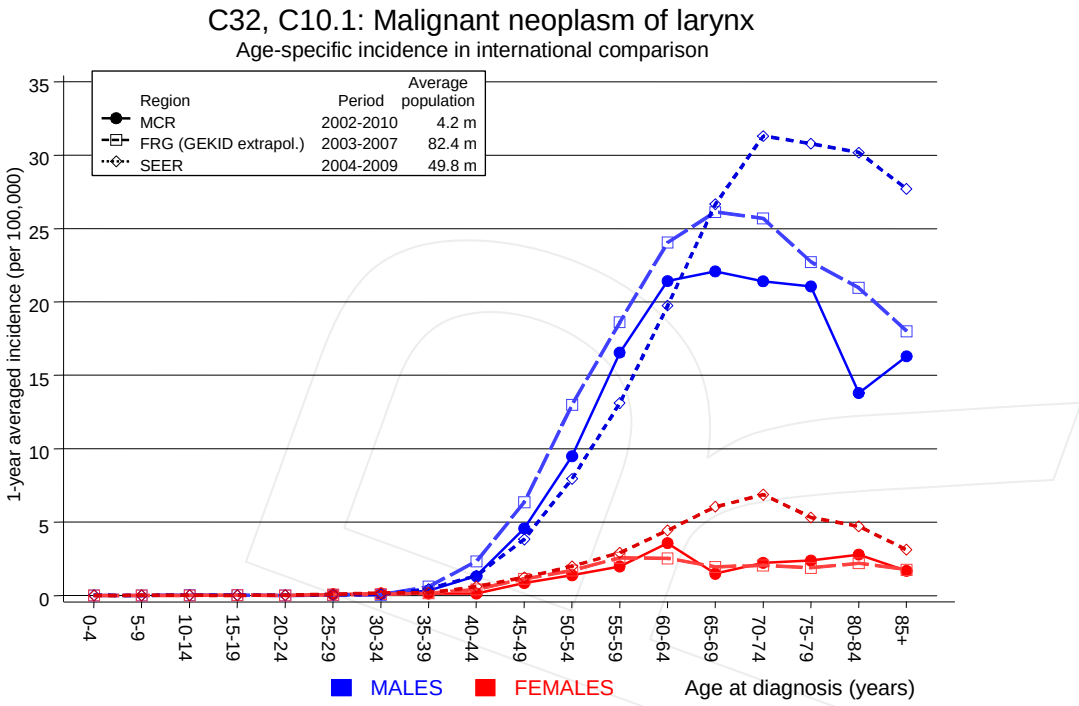


Figure 7a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Extrapolated age-specific patient population of Germany, data status middle of 2010. Association of Population-based Cancer Registries in Germany (GEKID e.V.). Berlin, 2011. http://www.gekid.de. Last access: 05/12/2011

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2012, based on the November 2011 submission. http://www.seer.cancer.gov.

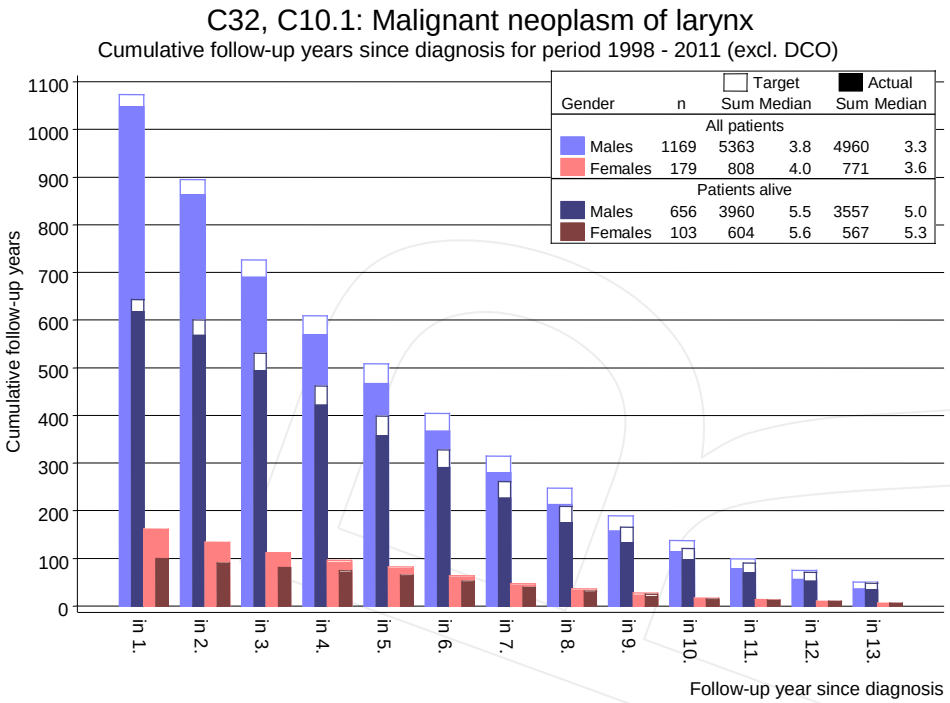
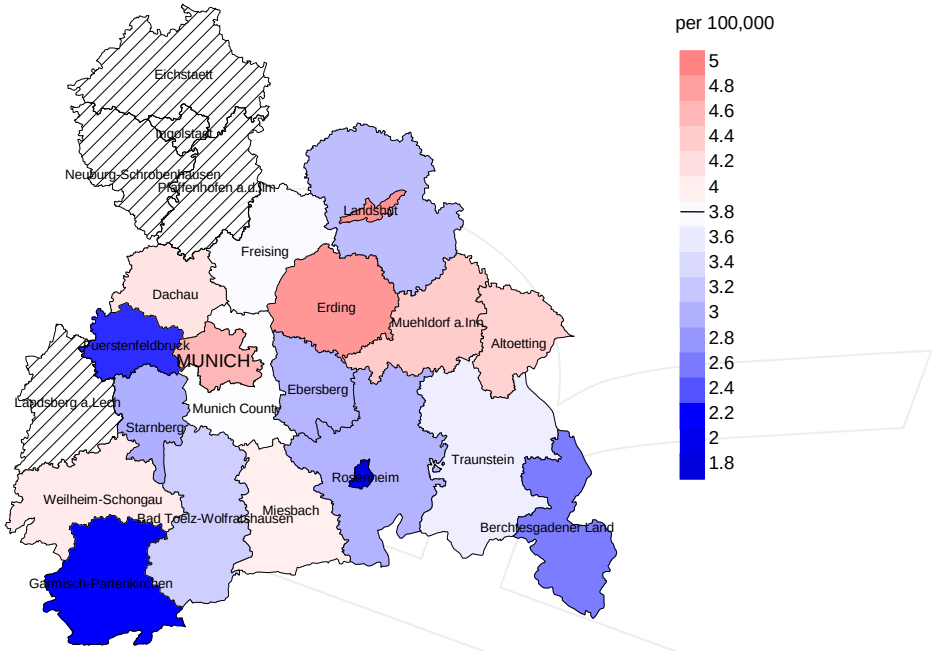


Figure 8. Cumulative follow-up years depending on time since diagnosis

The increase of the lost to follow-up rate can be interpreted as a consequence of a declining number of survivors over time.

Average incidence (world standard population) 2003 - 2008: Males



Average incidence (world standard population) 2003 - 2008: Females

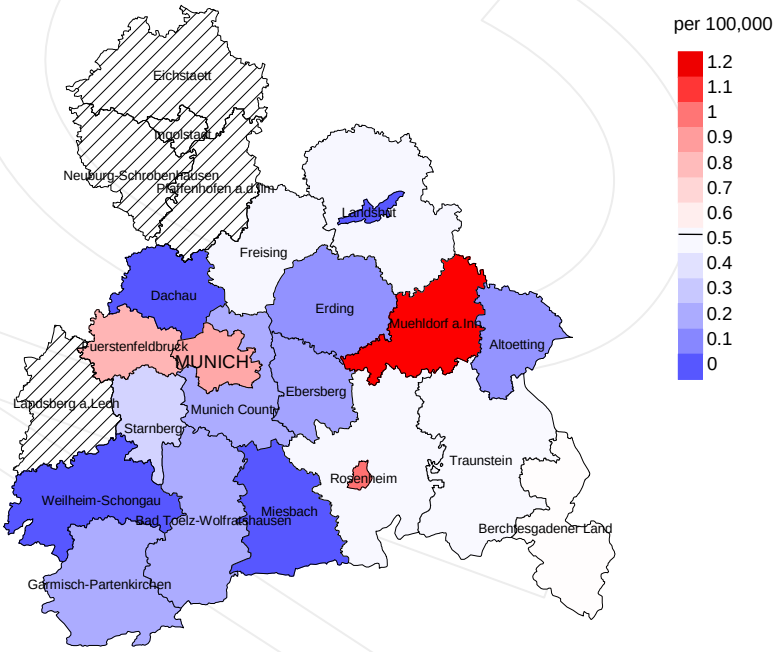
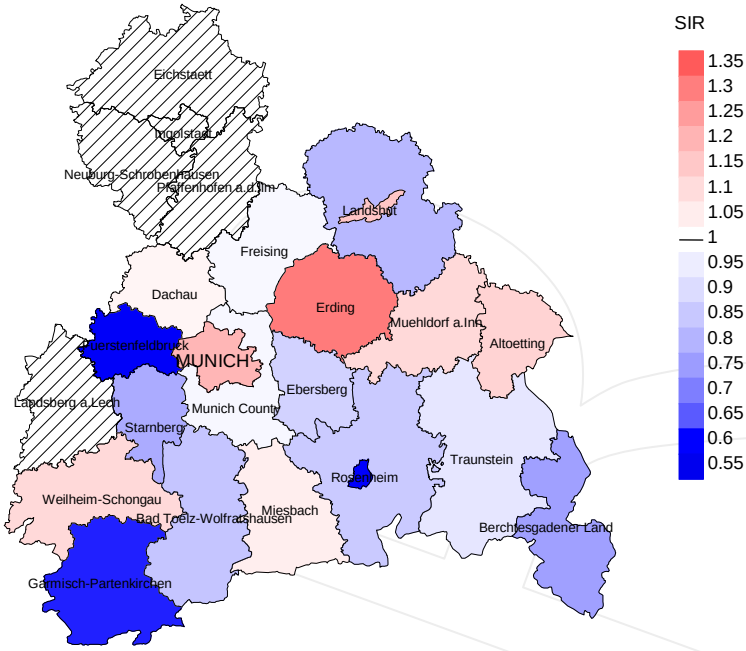


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 3.8/100,000 WS N=746, females 0.5/100,000 WS N=111). Since cancer data are not available in some counties until 2007, the local incidence rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 1 women were identified with newly diagnosed larynx cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 1.3/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males



Standardized incidence ratio (SIR) 2003 - 2008: Females

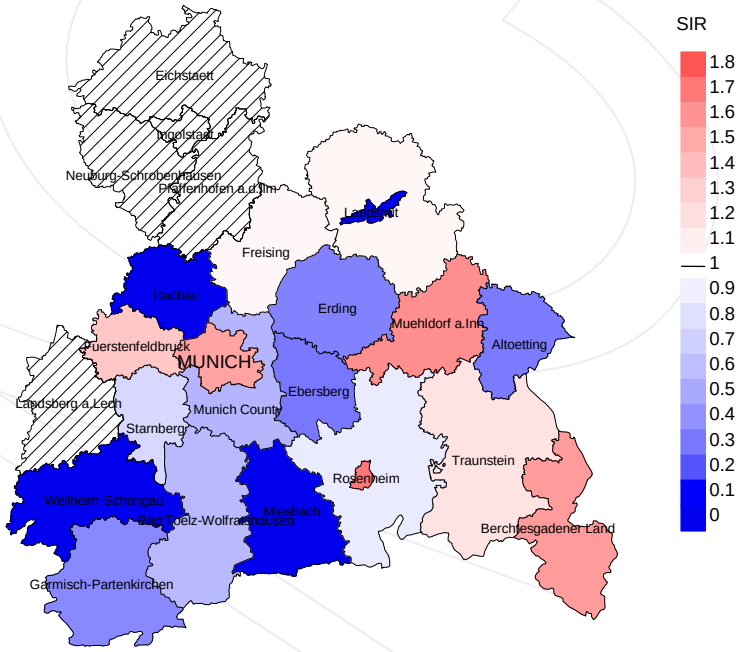


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=746, females N=111). Since cancer data are not available in some counties until 2007, the local SIR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 1 women were identified with newly diagnosed larynx cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.30. Though, the value of this parameter may vary with an underlying probability of 99% between 0.00 and 2.21, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status, proportion of DCO, deaths among the annual cohorts, and proportion of available death certificates (with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.52 m as of 2007, respectively)

Year of diagnosis	Incident cases n	Prop. actively followed %	Prop. DCO %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	105	92.4	3.8	68	64.8	91.2
1999	100	96.0	7.0	61	61.0	98.4
2000	94	96.8	5.3	62	66.0	90.3
2001	87	98.9	2.3	54	62.1	88.9
2002	178	97.8	7.9	114	64.0	98.2
2003	150	98.0	7.3	93	62.0	97.8
2004	143	97.2	9.8	89	62.2	96.6
2005	150	94.0	3.3	76	50.7	98.7
2006	133	96.2	5.3	66	49.6	95.5
2007	152	80.9	6.6	74	48.7	98.6
2008	173	73.4	6.9	76	43.9	94.7
2009	169	72.2	7.1	65	38.5	100.0
2010	135	85.2	5.2	49	36.3	93.9
2011	120	66.7	8.3	30	25.0	100.0
1998-2011	1889	88.2	6.4	977	51.7	96.1

Table 10b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased the same year of cancer diagnosis
(incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.52 m as of 2007, respectively)

Year of diagnosis/ death	Incident cases n	Deaths n	Prop. deaths with death certific. %	Deaths in same year n	Prop. deaths in same year %
1998	105	68	94.1	8	7.6
1999	100	94	87.2	13	13.0
2000	94	68	98.5	7	7.4
2001	87	68	86.8	9	10.3
2002	178	118	94.9	29	16.3
2003	150	105	99.0	19	12.7
2004	143	111	98.2	22	15.4
2005	150	100	95.0	18	12.0
2006	133	126	96.0	15	11.3
2007	152	139	97.1	20	13.2
2008	173	157	98.1	23	13.3
2009	169	136	97.8	24	14.2
2010	135	130	96.2	25	18.5
2011	120	108	99.1	17	14.2
1998-2011	1889	1528	96.0	249	13.2

Table 10c

Annual cohorts of deaths, proportion of cancer-related and not cancer-related deaths, and cancer recorded on death certificates (incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.52 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. not cancer-related %	Prop. cancer recorded on death certificate %
1998	68	64.7	35.3	84.4
1999	94	62.8	37.2	82.9
2000	68	61.8	38.2	82.1
2001	68	64.7	35.3	84.7
2002	118	66.9	33.1	81.3
2003	105	62.9	37.1	84.6
2004	111	70.3	29.7	83.5
2005	100	71.0	29.0	90.5
2006	126	61.9	38.1	77.7
2007	139	70.5	29.5	87.4
2008	157	71.3	28.7	87.0
2009	136	69.1	30.9	81.2
2010	130	74.6	25.4	85.6
2011	108	67.6	32.4	86.9
1998-2011	1528	67.7	32.3	84.3

Table 11a

Means of age at death according to the grouping in Table 10
MALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (not cancer-related) Years	Age at death (according to death certificate) Years
1998	58	67.9	66.6	70.1	67.2
1999	83	67.1	65.9	69.1	64.9
2000	58	68.0	64.2	74.6	68.0
2001	56	66.7	64.0	73.5	64.7
2002	101	69.2	68.4	70.8	68.8
2003	89	68.1	66.5	70.8	66.7
2004	96	68.6	66.6	73.3	67.2
2005	87	70.8	69.0	74.6	69.1
2006	113	70.2	67.9	74.4	68.8
2007	120	69.4	68.6	71.4	69.1
2008	144	72.0	70.2	76.2	71.4
2009	126	71.9	70.3	75.6	70.8
2010	118	70.9	69.5	74.9	69.6
2011	92	71.4	71.3	71.7	71.3
1998-2011	1341	69.8	68.3	73.1	68.8

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 11b

Means of age at death according to the grouping in Table 10
FEMALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (not cancer-related) Years	Age at death (according to death certificate) Years
1998	10	66.9	65.4	70.4	64.1
1999	11	70.7	72.6	67.2	70.1
2000	10	72.8	67.6	78.0	67.0
2001	12	81.2	81.9	80.9	80.9
2002	17	73.8	70.3	80.1	71.6
2003	16	70.4	66.0	77.6	69.5
2004	15	72.7	74.0	70.0	69.6
2005	13	64.2	66.3	53.1	65.6
2006	13	72.2	69.3	74.0	71.5
2007	19	71.1	70.5	72.9	70.8
2008	13	73.2	71.7	81.5	71.6
2009	10	69.9	64.8	81.7	67.8
2010	12	80.2	77.6	87.8	78.9
2011	16	73.4	73.9	69.3	73.8
1998-2011	187	72.3	70.7	75.6	71.0

By 2010, life expectancy for a newborn male in Germany is 77.5 years compared with 82.6 years for his female counterpart.

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 12a

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
MALES

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	37	3.3	0.40	2.0	0.37	2.9	0.39	3.8	0.44
1999	52	4.6	0.61	2.9	0.61	4.2	0.63	5.2	0.68
2000	37	3.2	0.48	2.0	0.47	2.9	0.48	3.4	0.48
2001	40	3.5	0.52	2.1	0.52	3.0	0.52	3.4	0.51
2002	68	3.6	0.44	2.1	0.40	3.1	0.43	3.9	0.49
2003	56	3.0	0.43	1.8	0.42	2.5	0.43	3.0	0.45
2004	68	3.6	0.54	2.0	0.50	3.0	0.53	3.6	0.55
2005	60	3.2	0.44	1.6	0.39	2.5	0.41	3.4	0.48
2006	73	3.8	0.66	2.0	0.58	3.0	0.61	3.9	0.71
2007	84	3.8	0.65	2.0	0.59	3.0	0.62	3.6	0.65
2008	101	4.5	0.67	2.3	0.62	3.5	0.63	4.4	0.67
2009	87	3.9	0.59	1.9	0.52	2.9	0.56	3.9	0.62
2010	88	3.9	0.75	2.0	0.69	2.9	0.71	3.7	0.76
2011	59	2.6	0.63	1.2	0.56	1.9	0.59	2.4	0.61
1998-2011	910	3.6	0.56	2.0	0.52	2.9	0.54	3.7	0.58

Table 12b

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
FEMALES

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	7	0.6	0.58	0.3	0.63	0.5	0.60	0.5	0.58
1999	7	0.6	0.47	0.2	0.34	0.4	0.39	0.6	0.47
2000	5	0.4	0.29	0.2	0.20	0.3	0.25	0.4	0.28
2001	4	0.3	0.40	0.1	0.17	0.1	0.24	0.3	0.38
2002	11	0.6	0.44	0.2	0.41	0.4	0.41	0.5	0.42
2003	10	0.5	0.48	0.3	0.51	0.4	0.51	0.5	0.49
2004	10	0.5	0.63	0.2	0.40	0.3	0.45	0.4	0.55
2005	11	0.6	0.79	0.3	0.67	0.4	0.69	0.5	0.75
2006	5	0.2	0.23	0.1	0.18	0.2	0.20	0.2	0.23
2007	14	0.6	0.64	0.3	0.48	0.4	0.53	0.5	0.58
2008	11	0.5	0.50	0.2	0.36	0.3	0.38	0.3	0.40
2009	7	0.3	0.33	0.2	0.39	0.2	0.39	0.3	0.34
2010	9	0.4	0.53	0.1	0.36	0.2	0.40	0.3	0.42
2011	14	0.6	0.54	0.2	0.38	0.3	0.41	0.4	0.49
1998-2011	125	0.5	0.48	0.2	0.39	0.3	0.41	0.4	0.45

Table 13

Age distribution of age at death (cancer-related) for period 1998-2011
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
35-39	2	0.2	0.2	1	0.1	0.1	1	0.8	0.8
40-44	8	0.8	1.0	8	0.9	1.0			0.8
45-49	27	2.6	3.6	25	2.7	3.7	2	1.6	2.4
50-54	75	7.2	10.8	69	7.5	11.3	6	4.8	7.2
55-59	112	10.8	21.6	100	10.9	22.2	12	9.6	16.8
60-64	160	15.4	37.0	145	15.9	38.1	15	12.0	28.8
65-69	210	20.2	57.2	190	20.8	58.9	20	16.0	44.8
70-74	142	13.7	70.8	118	12.9	71.8	24	19.2	64.0
75-79	139	13.4	84.2	122	13.3	85.1	17	13.6	77.6
80-84	93	9.0	93.2	80	8.8	93.9	13	10.4	88.0
85+	71	6.8	100.0	56	6.1	100.0	15	12.0	100.0
All ages	1039	100.0		914	100.0		125	100.0	

Included in the statistics are 39.6% multiple primaries in males and 38.5% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2011
(**incl. multiple primaries**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34			0.0		0.0			
35-39	1	1	0.0	0.10	0.0	0.33	0.3	0.2
40-44	8		0.4	0.24	0.0		1.1	
45-49	25	2	1.3	0.28	0.1	0.13	1.6	0.1
50-54	69	6	4.1	0.43	0.3	0.26	2.4	0.2
55-59	100	12	6.4	0.39	0.7	0.31	1.9	0.3
60-64	145	15	9.5	0.47	0.9	0.35	1.9	0.3
65-69	190	20	13.9	0.64	1.3	0.67	1.8	0.3
70-74	118	24	11.4	0.52	1.9	0.67	1.1	0.3
75-79	122	17	18.1	0.87	1.7	0.71	1.1	0.2
80-84	80	13	19.7	1.27	1.6	0.59	0.9	0.1
85+	56	15	20.2	1.30	2.0	1.25	0.8	0.1
All ages	914	125					1.4	0.2
Mortality								
Raw			3.6	0.56	0.5	0.48		
WS			2.0	0.52	0.2	0.39		
ES			2.9	0.54	0.3	0.41		
BRD-S			3.7	0.59	0.4	0.45		
PYLL-70								
per 100,000			21.3		2.2			
ES			19.0		1.9			
AYLL-70			9.0		8.8			

The rates underestimate the prognosis if other synchronous cancers are prognostic unfavorable.

Table 15a

Multiple primaries in deaths in period 1998-2011
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	39	6.3	9	23.1	7	17.9	23	59.0
C09-C10 Oropharynx	30	4.8			5	16.7	25	83.3
C12-C13 Hypopharynx	22	3.5	3	13.6	4	18.2	15	68.2
C15 Oesophagus	33	5.3	3	9.1	5	15.2	25	75.8
C16 Stomach	13	2.1	1	7.7	2	15.4	10	76.9
C18 Colon	38	6.1	10	26.3	1	2.6	27	71.1
C19-C20 Rectum	16	2.6	1	6.3	1	6.3	14	87.5
C22 Liver	16	2.6			2	12.5	14	87.5
C25 Pancreas	14	2.3			2	14.3	12	85.7
C32 Larynx	33	5.3			4	12.1	29	87.9
C33-C34 Lung	155	24.9	23	14.8	16	10.3	116	74.8
C43 Malign. melanoma	8	1.3	3	37.5			5	62.5
C44 Skin others	26	4.2	10	38.5	2	7.7	14	53.8
C61 Prostate	58	9.3	22	37.9	7	12.1	29	50.0
C64 Kidney	10	1.6	1	10.0	1	10.0	8	80.0
C67 Bladder	32	5.1	9	28.1	1	3.1	22	68.8
C70-C72 CNS cancer	7	1.1	2	28.6	2	28.6	3	42.9
C76-C79 CUP	14	2.3	4	28.6			10	71.4
C82-C85 NHL	10	1.6	3	30.0	2	20.0	5	50.0
C91-C96 Leukaemia	6	1.0	1	16.7			5	83.3
Other primaries	42	6.8	16	38.1			26	61.9
All mult. primaries	622	100.0	121	19.5	64	10.3	437	70.3

Multiple primaries with number of cases n<6 are pooled in category "Other primaries".

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a multiple malignancy.

Table 15b

Multiple primaries in deaths in period 1998-2011
FEMALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	5	5.8	3	60.0			2	40.0
C09-C10 Oropharynx	13	15.1	5	38.5	2	15.4	6	46.2
C11 Nasopharynx	1	1.2	1	100.0				
C12-C13 Hypopharynx	2	2.3					2	100.0
C15 Oesophagus	3	3.5	2	66.7			1	33.3
C16 Stomach	1	1.2					1	100.0
C18 Colon	8	9.3	2	25.0	2	25.0	4	50.0
C19-C20 Rectum	2	2.3					2	100.0
C22 Liver	1	1.2			1	100.0		
C25 Pancreas	1	1.2					1	100.0
C30-C31 Sinuses	1	1.2					1	100.0
C33-C34 Lung	15	17.4	3	20.0	2	13.3	10	66.7
C43 Malign. melanoma	2	2.3					2	100.0
C44 Skin others	3	3.5					3	100.0
C50 Breast	13	15.1	7	53.8	1	7.7	5	38.5
C51 Vulva	2	2.3					2	100.0
C53 Cervix uteri	1	1.2	1	100.0				
C54 Corpus uteri	2	2.3					2	100.0
C67 Bladder	2	2.3	1	50.0			1	50.0
C73 Thyroid	1	1.2	1	100.0				
C76-C79 CUP	3	3.5					3	100.0
C82-C85 NHL	2	2.3	1	50.0			1	50.0
C90 Mult. myeloma	1	1.2	1	100.0				
C91-C96 Leukaemia	1	1.2					1	100.0
All mult. primaries	86	100.0	28	32.6	8	9.3	50	58.1

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a multiple malignancy.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2011
(**Singular primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34			0.0		0.0			
35-39	1	1	0.0	0.11	0.0	0.33	0.3	0.2
40-44	7		0.3	0.24	0.0		1.0	
45-49	15	1	0.8	0.20	0.1	0.07	1.1	0.1
50-54	55	5	3.3	0.38	0.3	0.23	2.2	0.2
55-59	88	10	5.6	0.40	0.6	0.31	2.0	0.3
60-64	111	13	7.3	0.43	0.8	0.42	1.7	0.3
65-69	154	14	11.3	0.64	0.9	0.58	1.8	0.2
70-74	93	14	9.0	0.56	1.1	0.54	1.1	0.2
75-79	95	14	14.1	0.90	1.4	0.82	1.1	0.2
80-84	65	8	16.0	1.48	1.0	0.50	1.0	0.1
85+	42	13	15.1	1.83	1.8	1.44	0.8	0.1
All ages	726	93					1.3	0.2
Mortality								
Raw			2.9	0.55	0.4	0.46		
WS			1.6	0.50	0.2	0.37		
ES			2.3	0.53	0.2	0.39		
BRD-S			2.9	0.58	0.3	0.42		
PYLL-70								
per 100,000			16.9		1.8			
ES			15.1		1.5			
AYLL-70			8.9		9.1			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2011
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34			0.0		0.0			
35-39	1		0.0	0.13	0.0		0.3	
40-44	6		0.3	0.22	0.0		0.9	
45-49	13	1	0.7	0.19	0.1	0.08	1.0	0.1
50-54	39	5	2.3	0.33	0.3	0.24	1.7	0.3
55-59	57	5	3.7	0.31	0.3	0.19	1.4	0.2
60-64	67	9	4.4	0.33	0.6	0.32	1.2	0.2
65-69	83	9	6.1	0.41	0.6	0.50	1.1	0.2
70-74	48	6	4.7	0.35	0.5	0.25	0.6	0.1
75-79	50	8	7.4	0.53	0.8	0.53	0.7	0.1
80-84	35	6	8.6	0.90	0.8	0.46	0.7	0.1
85+	21	10	7.6	1.00	1.3	1.11	0.5	0.1
All ages	420	59					0.9	0.1
Mortality								
Raw			1.7	0.38	0.2	0.33		
WS			0.9	0.36	0.1	0.26		
ES			1.4	0.37	0.1	0.28		
BRD-S			1.7	0.40	0.2	0.30		
PYLL-70								
per 100,000			11.4		1.2			
ES			10.3		1.0			
AYLL-70			9.8		9.1			

* See corresponding tables with multiple primaries.

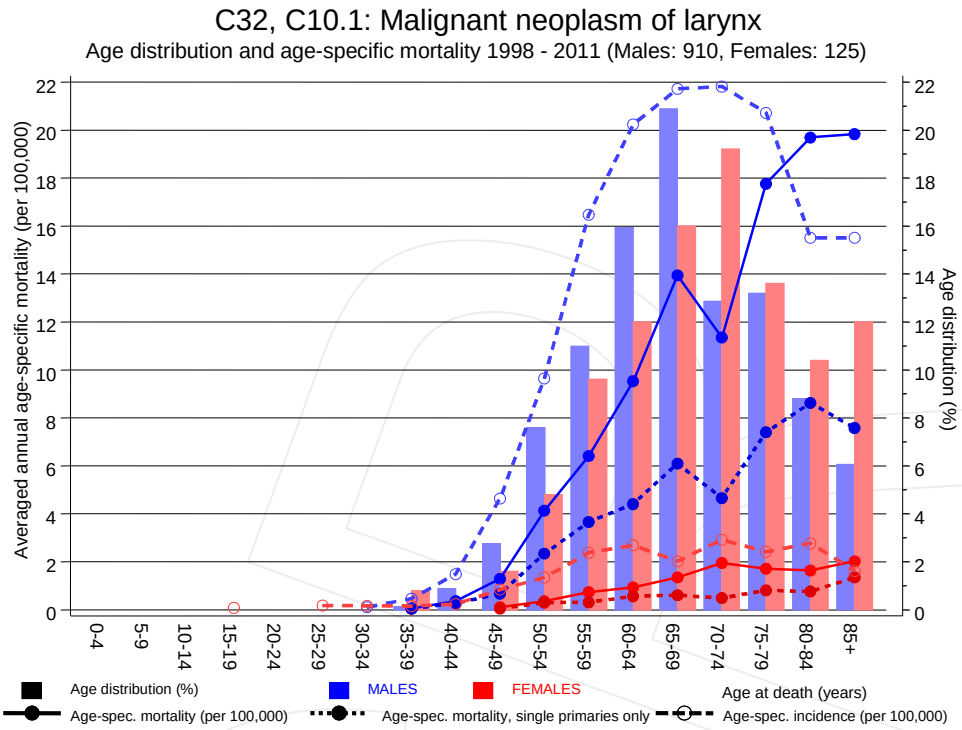
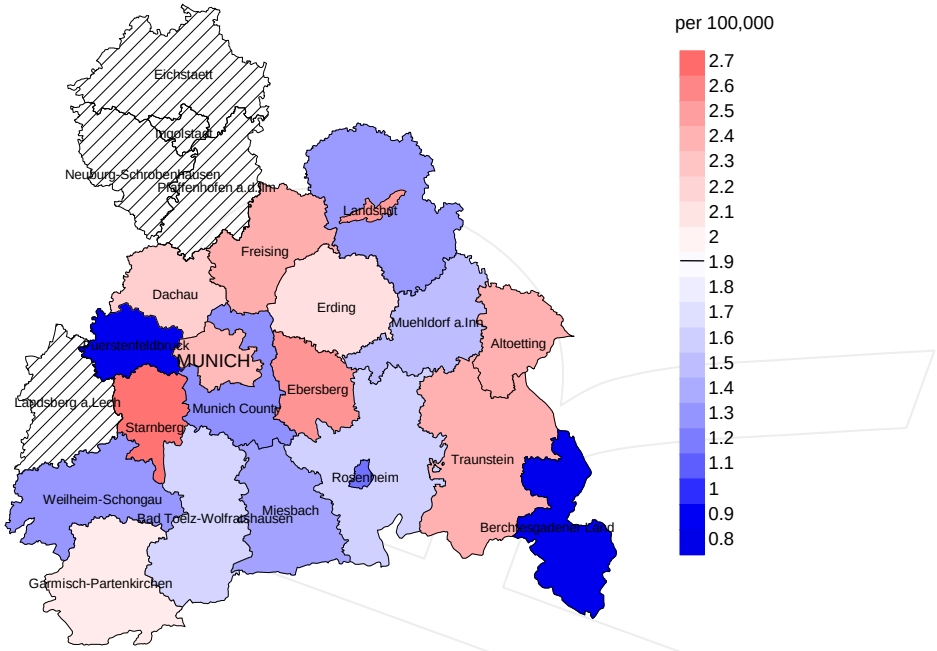


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

The difference between age at diagnosis (Table 3) and age at larynx cancer-related death (see Table 10) should be considered.

Average mortality (world standard population) 2003 - 2008: Males



Average mortality (world standard population) 2003 - 2008: Females

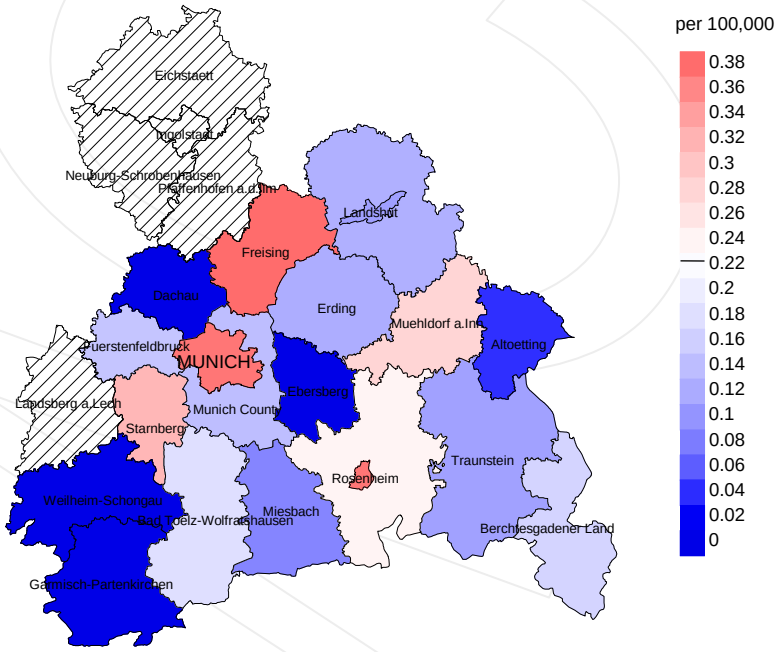
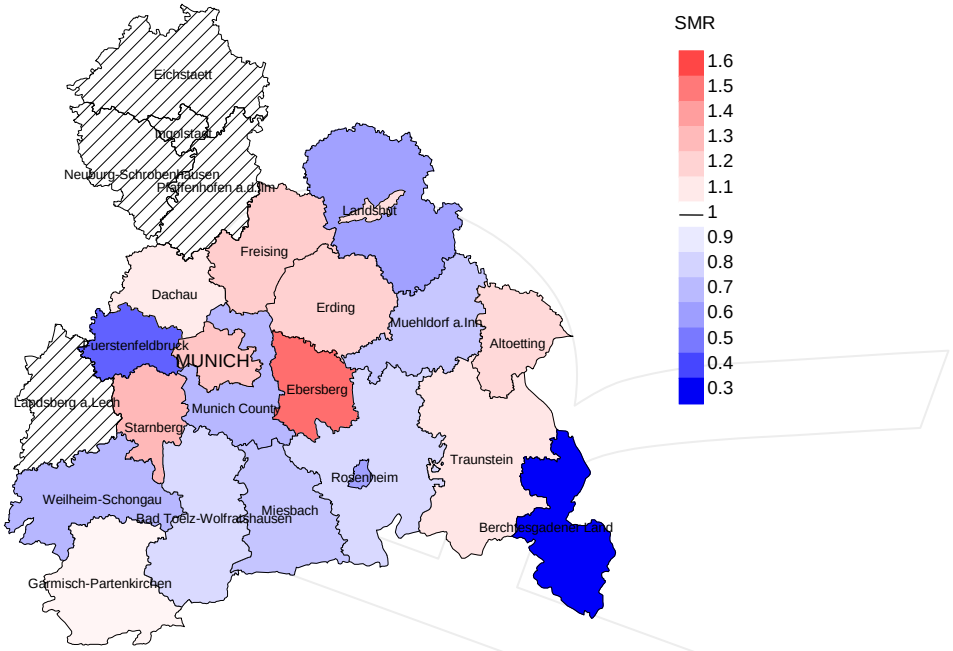


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 1.9/100,000 WS N=413, females 0.2/100,000 WS N=58). Since cancer data are not available in some counties until 2007, the local mortality rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 0 women died from larynx cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.0/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 1.4/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males



Standardized mortality ratio (SMR) 2003 - 2008: Females

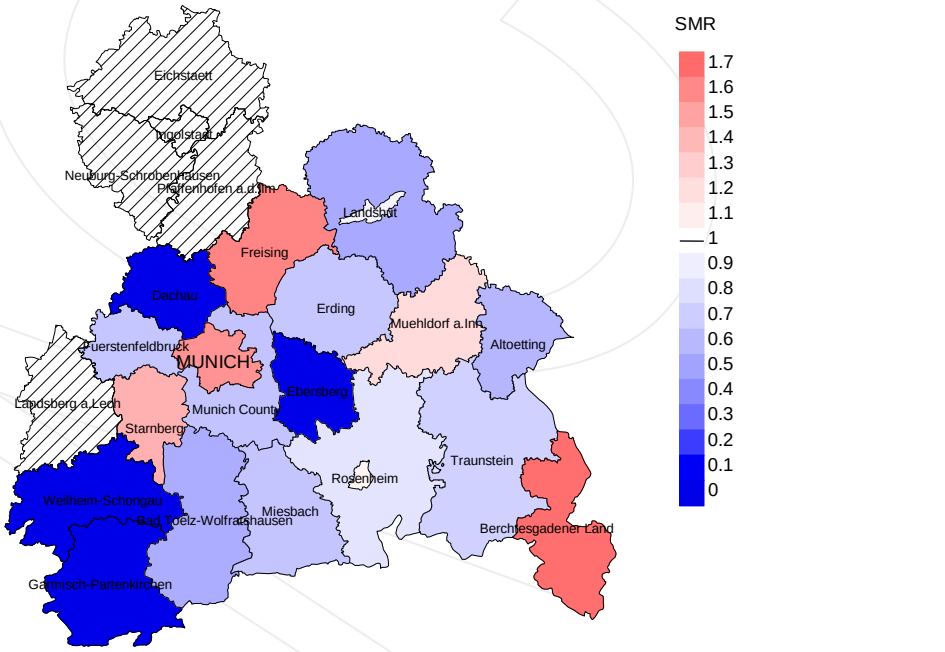


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=413, females N=58). Since cancer data are not available in some counties until 2007, the local SMR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 0 women died from larynx cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.00. Though, the value of this parameter may vary with an underlying probability of 99% between 0.00 and 3.09, and is therefore not statistically striking.

Statistical Notes

In all tables and figures the respective reference values should be carefully considered. The incidence rates include diagnoses (with multiple primary), and death certificate only (DCO) cases. For mortality statistics patients, diagnoses and progressive course of disease are presented. In the calculations, all courses of disease are considered whereby progressions occurred and/or death certificate identified progressive cancers were ascertained. Additionally there are three groups of disease course to consider:

1. **All multiple primaries included**

   The mortality statistic describes the tumor-specific death, independent of any malignancy. The patient perspective, induced secondary malignancies, and the problem of multiple malignancies from the same primary tumor all have reasons for their inclusion.

2. **First singular primary** (no information about other prior or synchronous malignancy)

   The mortality statistic describes the tumor-related death for patients who have no therapeutic restrictions due to a previous or synchronous cancer. These statistics are comparable to studies that have exclusion criteria based on a second malignancy.

3. **Single primary** (no information about other prior, syn- or metachronous malignancy)

   The mortality statistic describes the tumor-specific death that occurs without any impact through secondary primaries, earlier, synchronous, later or induced. Precisely the difference between disease group 1 and 2 highlight the magnitude of the problem of secondary malignancies.

For this reason differences appear concerning official mono-causal mortality statistics. To judge the maximum deviation, 2 further tables are presented. In the first table the distribution of secondary malignancies before, at or after the described cancer are shown, that could be an alternative cause of death. In the second table, the age-specific mortality rates for all courses of disease, without designation of secondary malignancies are shown.

A previously minimally acknowledged statistic is the **age at death**, which allows for a good assessment of the quality of classification of the apparent tumor-specific death. For assumed tumor-independent deaths, the age of death should be estimated from the age of diagnosis and the normal life expectancy, whereas tumor-dependent deaths can be estimated from the age of diagnosis plus the average tumor-specific life expectancy. The comparison of different tumors demonstrates this association, if the causes of cancer and the competing cause of death are independent of each other (e.g. breast and colon versus head/neck and lung).

The index from mortality and incidence (Mortality-Incidence ratio, **MI-index**) is a statistic that allows for the evaluation of the quality of data. For diseases with poor prognoses, comparable values are obtained from all age groups, because to a large extent, the numerator and denominator contain the same cases. For tumors with a good prognosis, increasing and decreasing incidence and age-specific differences in prognosis can more strongly alter the MI- index. Additionally, attention should be paid to the confidence intervals where fewer cases are reported.

The complexity of problems identified here emphasizes the importance of relative survival data for the appropriate analysis of long term results.

As a measurement of the burden of disease, the number of potential life years loss due to premature deaths in a cohort can be calculated (**PYLL**, potential years of life lost, standardized per 100,000 persons or per European standard) as well as the average loss of life years per individual (**AYLL**, average years of life lost). Depending upon the analytic aim (health economy, prevention, health care research) different methods exist for the generation of these measurements. In the results presented here, the age for a premature death is considered to be before 70 years, according to the guidelines of the OECD and the WHO (as seen in the abbreviation PYLL-70 or AYLL-70).

Shortcuts

AYLL-70	Average years of life lost prior to age 70 given a person dies before that age
BRD-S	German standard population
DCO	Death certificate only
EAR	Excess absolute risk = excess cancer cases (O - E) per 10,000 person-years
ES	European standard population (old)
FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
MCR	Munich Cancer Registry (Tumorregister München)
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SEER	Surveillance, Epidemiology, and End Results (USA)
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

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